

**UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF NEW YORK**

CAPITOL RECORDS, LLC, <i>et al</i> ,)	
)	
<i>Plaintiffs,</i>)	No. 07 Civ. 9931 (WHP)(FM)
)	
MP3TUNES, LLC,)	DECLARATION OF ELLIS HOROWITZ
)	
<i>Defendant.</i>)	
)	
MP3TUNES, LLC,)	<u>PORTIONS FILED UNDER SEAL</u>
)	
<i>Counter-Claimant,</i>)	
)	
CAPITOL RECORDS, LLC, <i>et al</i> ,)	
)	
<i>Counter-Defendants.</i>)	
)	

I, Ellis Horowitz, being duly sworn, declare as follow:

1. I currently hold the position of Professor of Computer Science and Electrical Engineering at the University of Southern California. My curriculum vitae is attached as Exhibit A. I have been asked by the plaintiffs in this case to provide the Court with some background regarding computer source code in general and the specific allegation that MP3tunes provides multiple users with access to the same individual file (what I understand the Court and the parties have referred to as the “single master architecture”). The observations and conclusions set forth below are based upon my specialized knowledge, education, and experience as applied to the facts and circumstances in this case. If called upon, I could and would testify as to the matters contained herein.

QUALIFICATIONS

2. I currently hold the position of Professor of Computer Science and Electrical Engineering at the University of Southern California. I am a past Chair of the USC Computer Science Department, from 1991 to 1999 and from 2008 to 2009, and a past Director of Information Technology and Distance Education at USC's Viterbi School of Engineering, from 1999 to 2001. Since 1983, I have been a full Professor of Computer of Science at USC. I have also been a visiting Professor at the Massachusetts Institute of Technology (MIT) and the Israel Institute of Technology (Technion), and I was an IBM Scholar from 1989 to 1993.

3. I am the author of ten books and over eighty journal articles on computer science subjects.

4. My research work for the past decade has been in the field of software engineering. I am a member of the Center for Software Engineering at USC, a research group whose focus is the study and improvement of software development. I have developed or co-developed numerous software systems in conjunction with the Center. In addition, from 1983 to 1993, I was the co-founder and CEO of Quality Software Products, a California corporation that specialized in the development of UNIX application software.

5. I have a Bachelor of Science (B.S.) degree in Mathematics from Brooklyn College (1964), and a Master of Science (M.S.) degree and a Doctor of Philosophy (Ph.D.) degree in Computer Science from the University of Wisconsin (1967, 1970). As further detailed in my curriculum vitae, I have extensive experience with computer systems and software analysis.

6. I have been accepted by federal courts as an expert in the field of computer science on several occasions; and, indeed, my testimony was accepted and credited by this Court

recently in the case of *Arista Records LLC, et al v. Usenet.com, Inc., et al.*, Case No. 07-civ-8822 (HB) (S.D.N.Y. filed October 12, 2007).

SUMMARY

7. I have reviewed a version of defendant's source code, which, as I understand it, was set aside in May 2008 following a court order and subsequently produced to plaintiffs. My review of the source code is ongoing. So far my review of the source code has revealed numerous places in the code that clearly indicate that defendant (i) only stores on its system a single copy¹ of digitally identical song files regardless of how many of defendant's users purport to upload that song file; and (ii) makes a single copy of a song file available to multiple users without regard to which user uploaded the file. Furthermore, I have found no portion of the source code inconsistent with this conclusion.

ANALYSIS

8. Every digital file is composed of a certain number of individual pieces of data, known as "bits." A bit is a fundamental unit of binary information, typically represented solely by either the number one ("1") or zero ("0"). The typical digital song file is composed of tens of millions of bits of information. These bits represent a recorded encoding of the acoustic pattern of a song. When decoded through the appropriate computer software and rendered through the appropriate computer hardware, the result is a playback of the song as recorded.

9. Because of the tens of millions of bits in a typical song file, identifying a file by its pattern of bits is impractical. Therefore, computer scientists have devised methods for

¹ When MP3tunes stores a file to its storage system it may make a pre-set number of archival copies. When I refer to a single file or single copy, I am referring to the copy and any one of the archival copies maintained by the software MP3tunes uses to organize its storage system.

identifying files using short, unique identifiers. The identifiers are known as “hashes” and a variety of different methods exist to create them. [REDACTED]

[REDACTED]

10. The MD5 hash is simply a large number which is typically written as a 32-digit sequence of characters.² Calculating the MD5 hash for a particular set of data is done through an algorithm that scans each bit in that set of data (such as a whole song file) and then generates a “hash” uniquely identifying that combination of bits. By using an MD5 hash, a digital file millions of bits long can be uniquely identified by a single identifier that is 32 characters in length.

11. Because the MD5 hash is the result of a mathematical calculation based on the sequence of bits in a particular file, two identical digital files will have the same MD5 hash. As a result, two people who download the same song file from the same online source will each have a separate copy of the song file with the same MD5 hash.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

² The digits 0 through 9 and A through F are the characters in the hexadecimal alphabet.

[REDACTED]

[REDACTED]

13. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]:

- [REDACTED]

- [REDACTED]

- [REDACTED]

14. I have reviewed the declaration of Douglas Reese submitted in support of defendant's opposition to plaintiffs' motion to amend and add a party. I note that Mr. Reese states that there is not, and never has been, a single master architecture. Mr. Reese, however, appears to define a single master architecture using criteria which are not particularly relevant to the single master architecture I have described herein. Mr. Reese appears to deny the existence of a single master architecture based on his claim that multiple copies of the same file are physically uploaded to the MP3tunes' storage servers by users. [REDACTED]

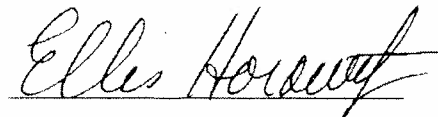
[REDACTED]

[REDACTED]

[REDACTED]

15. For the foregoing reasons, my review of the source code demonstrates that MP3tunes utilizes what I have described above as a single master architecture.

Executed on: August 21, 2009

A handwritten signature in cursive script, reading "Ellis Horowitz".

Ellis Horowitz

CERTIFICATE OF SERVICE

Joseph J. McFadden, an attorney, hereby certifies and/or states on oath that the within
Declaration of Ellis Horowitz was served on the below named individual(s) and law firm(s) via
electronic mail and overnight mail delivery on this 21st day of August, 2009:

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